

Homework Review

12) p 205  
Quadratic Function  
zeros 1 and -3  
passes through (-2, 10)

Write in Vertex Form

1) Factored  $f(x) = a(x-s)(x-t)$   
 $10 = a(2-1)(2+3)$   
 $10 = a(1)(5)$   
 $10 = 5a$   
 $a = 2$

2) Factored  $f(x) = a(x-s)(x-t)$   
 $f(x) = 2(x-1)(x+3)$   
 $\frac{s+t}{2} = \frac{-1+3}{2} = 1$   
 $\frac{s-t}{2} = \frac{-1-3}{2} = -2$   
 $(h, k) = (1, -8)$   
 $f(x) = a(x-h)^2 + k$   
 $f(x) = 2(x+1)^2 - 8$   
 $y = a(x-h)^2 + k$

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Functions 3 Forms

1) Standard  $ax^2 + bx + c = 0$

2) Vertex  $f(x) = a(x-h)^2 + k$

3) Factored  $f(x) = a(x-s)(x-t)$

Standard to Vertex Form

Completing the Square

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Completing the Square

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$(a+b)^2 = a^2 + 2ab + b^2$

$(a+b)(a+b)$  last term is a perfect  $\square$   
middle term is  $2ab$

"

$(x+9)^2 \Rightarrow x^2 + 18x + 81$

$(x-3)^2 \Rightarrow x^2 - 6x + 9$

$(2x+5)^2 \Rightarrow 4x^2 + 20x + 25$

$(x-4)^2 \Rightarrow x^2 - 8x + 16$

Completing the Square

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a)  $f(x) = \frac{ax^2 + bx + c}{x^2 + 8x - 9} \left(\frac{b}{2}\right)^2$

$f(x) = x^2 + 8x + 16 - 16 - 9$

$f(x) = (x+4)^2 - 16 - 9$  take it Square it

$f(x) = (x+4)^2 - 25$  add it or take it off

$(-4, -25)$   
h k

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$f(x) = x^2 - 6x - 14$

$f(x) = x^2 - 6x + 9 - 9 - 14$   $\left(\frac{6}{2}\right)^2 = 3^2 = 9$

$f(x) = (x-3)^2 - 9 - 14$

$f(x) = (x-3)^2 - 23$

$(3, -23)$   
h k

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$$\begin{aligned}
 f(x) &= x^2 - 4x + 9 \\
 f(x) &= x^2 - 4x + 4 - 4 + 9 \\
 f(x) &= (x-2)^2 - 4 + 9 \\
 f(x) &= (x-2)^2 + 5 \\
 &\quad \begin{matrix} h & k \\ (2, 5) \end{matrix}
 \end{aligned}$$

$\frac{4}{2} = 2$   
 $= 4$

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$$\begin{aligned}
 f(x) &= 2x^2 + 20x + 5 \\
 f(x) &= 2(x^2 + 10x) + 5 \quad \text{Partial Factoring} \\
 f(x) &= 2(x^2 + 10x + 25 - 25) + 5 \\
 f(x) &= 2(x+5)^2 - 25 + 5 \\
 f(x) &= 2(x+5)^2 - 50 + 5 \\
 f(x) &= 2(x+5)^2 - 45 \\
 &\quad \begin{matrix} h & k \\ (-5, -45) \end{matrix}
 \end{aligned}$$

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Completing the Square

$$\begin{aligned}
 f(x) &= -x^2 + 6x + 7 \\
 \text{Partial factor} \\
 f(x) &= -(x^2 - 6x) + 7 \\
 f(x) &= -(x^2 - 6x + 9 - 9) + 7 \\
 f(x) &= -[(x-3)^2 - 9] + 7 \\
 f(x) &= -(x-3)^2 + 9 + 7 \\
 f(x) &= -(x-3)^2 + 16
 \end{aligned}$$

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$$\begin{aligned}
 f(x) &= -3x^2 + 6x - 7 \\
 f(x) &= -3(x^2 - 2x) - 7 \quad \left(\frac{b}{2}\right)^2 \\
 f(x) &= -3(x^2 - 2x + 1 - 1) - 7 \\
 f(x) &= -3[(x-1)^2 - 1] - 7 \\
 f(x) &= -3(x-1)^2 + 3 - 7 \\
 f(x) &= -3(x-1)^2 - 4 \\
 &\quad (1, -4)
 \end{aligned}$$

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$$\begin{aligned}
 f(x) &= -3x^2 + 15x - 2 \\
 f(x) &= -3(x^2 - 5x) - 2 \\
 f(x) &= -3\left(x^2 - 5x + \frac{25}{4} - \frac{25}{4}\right) - 2 \quad \left(\frac{5}{2}\right)^2 = \frac{25}{4} \\
 f(x) &= -3\left(x - \frac{5}{2}\right)^2 - \frac{25}{4} - 2 \quad \frac{5}{2} \times \frac{5}{2} \\
 f(x) &= -3\left(x - \frac{5}{2}\right)^2 + \frac{75}{4} - 2 \\
 f(x) &= -3\left(x - \frac{5}{2}\right)^2 + \frac{75}{4} - \frac{8}{4} \quad \frac{2 \times 4}{1} = \frac{8}{4} \\
 f(x) &= -3\left(x - \frac{5}{2}\right)^2 + \frac{67}{4} \\
 &\quad \left(\frac{5}{2}, \frac{67}{4}\right)
 \end{aligned}$$

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$$\begin{aligned}
 f(x) &= -2x^2 + 16x - 9 \\
 f(x) &= -2(x^2 - 8x) - 9 \quad \left(\frac{8}{2}\right)^2 = 16 \\
 f(x) &= -2(x^2 - 8x + 16 - 16) - 9 \\
 f(x) &= -2[(x-4)^2 - 16] - 9 \\
 f(x) &= -2(x-4)^2 + 32 - 9 \\
 f(x) &= -2(x-4)^2 + 23 \\
 &\quad (4, 23)
 \end{aligned}$$

Oct 18-9:01 AM

$$\begin{aligned}
 f(x) &= -3x^2 + 24x - 12 \\
 f(x) &= -3(x^2 - 8x) - 12 \\
 f(x) &= -3[x^2 - 8x + 16] - 12 \quad \left(\frac{8}{2}\right)^2 = 16 \\
 f(x) &= -3(x-4)^2 - 12 \\
 f(x) &= -3(x-4)^2 + 48 - 12 \\
 f(x) &= -3(x-4)^2 + 36 \\
 &\quad (4, 36)
 \end{aligned}$$

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Hmk  
P 214 q. 3, 4, 6 & 8

$$\begin{aligned}
 y &= (x-3)^2 - 23 & (x+4)^2 - 22 \\
 &\quad (3, -23) & (h, k) \\
 y &= a(x-h)^2 + k & (-4, -22)
 \end{aligned}$$

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$$\begin{aligned}
 f(x) &= -x^2 - 6x - 14 \\
 f(x) &= -1(x^2 + 6x) - 14 \\
 &\dots
 \end{aligned}$$

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